"INSTANT INFORMATION"

THROUGH ADA

MIB COPY

We are indebted to [redacted] for this copy

STAT

FOREWORD

This paper describes the Automatic Data Acquisition (ADA) System which is presently in use at LMSC to collect operating data and report status control information. It describes existing applications in procurement and manufacturing organizations.

This information on ADA may suggest other uses to the reader in areas where existing methods and procedures are either too cumbersome or antiquated to provide "Instant Information."

[redacted]

STAT

Dept. 59-26

6 March 1964

Lockheed Missiles & Space Company, Sunnyvale, California, has applied space age communications and control concepts to the down-to-earth data gathering and information retrieval requirements that exist within the company's business and manufacturing facilities.

This new business data processing system in use at LMSC is called ADA (Automatic Data Acquisition). It is presently in use in the company's factory organizations where it collects information and transmits it in a continuous stream to the company's Computation Center in much the same way as a space vehicle in flight transmits a steady stream of data to earth-bound computers which monitor and control the vehicle's flight.

The functions performed by the computers for an aerospace vehicle on its mission and for a factory in full operation are very similar. In each case, the data fed to the computer from a remote location are automatically recorded on magnetic tape to form a complete and continuous chronological record of all significant events. As sufficient amounts of data are accumulated on magnetic tape it is fed to other computers which use the raw input data to update historical records and to produce printed reports of current events. For instance, data received from the space vehicle can be used to track the vehicle's progress in space and to predict and control the vehicle's future course. In the case of factory operations, the data received can be used to prepare a variety of operations status reports, produce payroll checks, or forecast future manufacturing activity in the various operating areas.

In each case, the data received by the computer are automatically examined to recognize "inquiry" messages which require an immediate "reply" from the computer. In one case the reply messages generated by the computer will, for example, cause the space vehicle's motors to operate just enough to adjust to a new course; in the case of the business system the printed reply received from the computer will, for example, pinpoint the exact location of a specific order for parts in the factory to permit an immediate change in shop paper work to reflect revised engineering requirements.

The incoming data are also scanned by the computer to recognize types of data which must be mechanically stored for possible future use in response to inquiries. It is at this point that a noticeable difference between the space vehicle application and the business application occurs. Not a great deal of immediately accessible historical information is needed to respond to an inquiry message from a vehicle in flight, whereas an effective factory control system must have access to an accumulation of up-to-the-minute information on every item which is to be controlled. To consistently answer questions on the location and status of any given shop order, for instance, the computer system must have immediate access to the latest information on the location and status of all open shop orders. At Lockheed there are normally 40,000 active shop orders which are being processed to completion at the rate of 2,000 per week. Consequently, the factory control system uses a large-scale random-access Data Disc File to store these and other similar records needed by the computer to answer inquiries concerning factory operations.

Business data processing men have long considered the problems of developing a hardware system to collect data and report it directly from the information source to a central data processing center. The successful development of such a system would have the obvious advantage of eliminating the need to prepare handwritten transmittal documents which, in turn, require manual translation into punched card form for machine processing under batch control. A further advantage of such a system would be the elimination of many control and audit activities that are normally required to ensure accurate reporting, preparation and processing of the manually recorded data.

It is not surprising that sophisticated space vehicle-to-computer communications systems were developed before a similarly successful large scale system was developed to perform business data processing functions. After all, traditional requirements for maintenance of "audit trails" that burden a business function do not apply to space systems; expensive hard wire circuits between remote locations and the central equipment are neither required nor possible to protect the space system from equipment malfunction or human error. Such protection for space applications is accomplished by a highly reliable "destruct button" and a "back-to-the drawing board" philosophy which would, of course, be completely impractical in a business system.

In 1958, Lockheed Aircraft Corporation determined that a workable business data collection and inquiry reply system could be developed which would utilize voice-grade telephone lines to transmit operating data from remote units in factory areas to a central area where automatic data processing could be accomplished. As a result, existing data collection equipment was carefully considered by each of Lockheed's major companies. The results of each study were evaluated and specifications were developed to fulfill the requirements of each Lockheed company. These specifications were reviewed by several prospective equipment vendors. The Radio Corporation of America reviewed the specifications and submitted proposals to install ADA systems at each of Lockheed's three major companies: Burbank, California; Marietta, Georgia; and Sunnyvale, California.

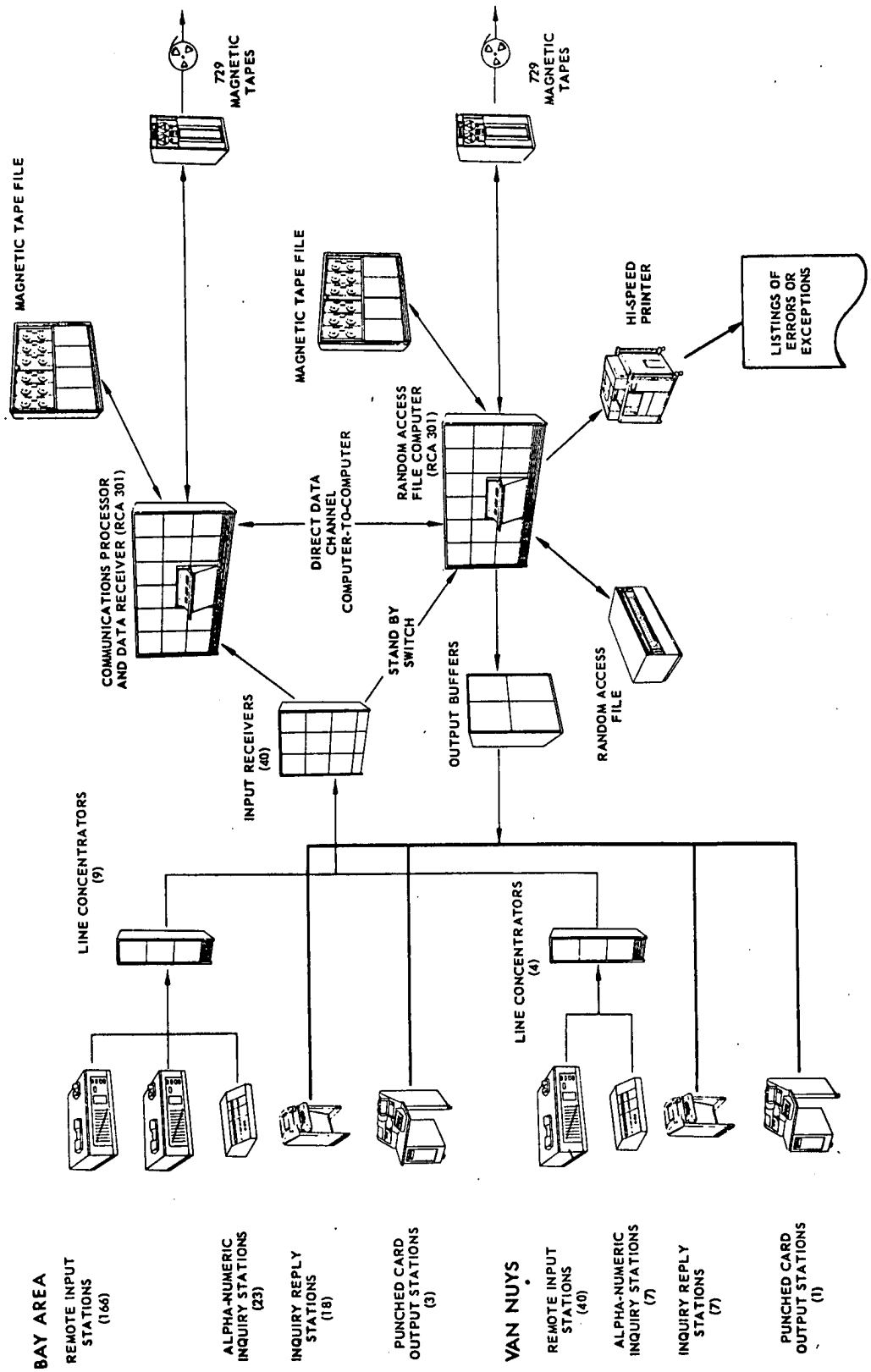
The ADA hardware system supplied by RCA for use at LMSC, in Sunnyvale, includes RCA Remote Input Stations, Model 6220. These stations (206 are now in use) collect operating data and transmit it from outlying company facilities to a central Computation Center. The facilities serviced by the ADA Remote Input Stations network are located at distances from less than one mile up to 400 miles from the Computation Center. All locations have equal access to the centralized processing equipment located at the Computation Center. A diagram of the ADA system is shown on the next page.

These RCA Remote Input Stations can be easily installed in any production work area. Each unit requires only a 115-volt, 60-cycle, outlet for power and a two-wire voice-grade telephone line for transmission of data to the central facility.

Requ
no rc
wiring
remote stat
a very
desir
feat

The Remote Input Station enables an operator to record 80 columns of data from a punched card; 12 alphanumeric characters from a plastic employee identification token; 10 numeric characters from variable data levers; and 1 of 11 possible transaction codes from a transaction control lever. Each unit is also equipped with internal interlock devices which are effective according to the position at which the transaction lever is set. For instance, position "0" has been assigned to record

A we
could elimin
both Time Shar
and work pha



employee clock-in and clock-out transactions. Therefore, the input units are set to require only the insertion of an employee identification token when the transaction lever is set to the "O" position. Other transaction lever positions require various combinations of punched card, employee token, and variable lever settings before transmission of data can occur.

The stations are also designed to permit the operator to sight-check the completed set-up of the punched card, token, and variable data input levers before he presses a button to initiate transmission of data to the Computation Center. Once the operator initiates the transmission, his card and ID token are locked into position within the unit until successful transmission is achieved and an answer-back signal is received from the Computation Center. The answer-back signal is received only after the parity of each character in the message has been checked and proper message length has been verified. In the event of an unsuccessful transmission attempt, the input station will repeatedly retransmit the message until a successful transmission occurs or 15 seconds elapse. If successful transmission does not occur within 15 seconds the unit's connection to the Computation Center is broken and an indication is flashed to the operator at the unit. It is then necessary to press a release button on the unit in order to retrieve the input card and ID token for examination prior to initiating corrective action.

The transmission speed of the Remote Input Station is 27.7 characters per second, including the time required for the quality and accuracy checks automatically made by the Remote Input Station and the Computation Center's equipment.

A second type of input station used at Lockheed to feed data into the ADA system is the Alphanumeric Input Station, RCA Model 6222. Twenty-five of these units are installed at strategic locations throughout LMSC's facilities for use in transmitting inquiry messages to the Computation Center. The Alphanumeric Input Station (usually called an Inquiry Station), operates in a manner similar to the Remote Input Station except that it provides 25 variable input wheels instead of punched card or plastic

token input. Each wheel can be set to any one of 37 alphanumeric characters needed to format one position of an inquiry message up to 25 characters in length. A single wheel is also provided to input a transaction code to accompany the inquiry to the Computation Center.

Each Remote Input Station and Inquiry Station includes a Subset Transmitter which provides the means for serial transmission of data via telephone lines to a Line Concentrator. The function of the Line Concentrator is to act as a switching intermediary to distribute the intermittent demand for service from up to 25 Remote Input Stations or Inquiry Stations in order to time-share four trunk lines connected from a Line Concentrator to the Computation Center's receiver equipment.

The installation of ADA's Remote Input Station network was started in March 1962, when an initial installation of 36 Stations was made in two factory buildings at Sunnyvale.

Every reasonable precaution was taken to ensure the highest probability of successful operation of the new data collection network prior to this first large-scale production use of such a system. However, due to the many complex requirements that would be placed on the production system, it was not possible to simulate an entire network in a laboratory or in a small prototype installation. Consequently, some thoughful planning was required of LMSC and RCA prior to installation of the initial 36 Remote Input Station network in order to provide for the buildup of the load on the system under controlled conditions. Additionally, it was planned that the network Remote Input Stations would not initially be tied directly to on-line digital computers. Instead, the data transmitted from the input stations would be fed into receiving units which would automatically prepare punched paper tape. The punched paper tape would then be used to create punched cards or magnetic tape records which could be used as input to the existing batch processing computer applications.

Factory labor distribution recording was the first task selected for the new systems. This job was selected primarily because the labor charges recorded via the system could be machine-checked and compared against the total time recorded on the employee's timecard. Further, in case any systems problems developed and persisted for a significant length of time, the employee could be instructed to return to the old method of recording his labor charges in the familiar space provided on his timecard.

The details of labor distribution recording were already well known to the company's internal auditors; therefore, the audit staff could provide valuable assistance in verifying the system's operating accuracy. Since the only major change in the existing application was the elimination of handwritten recording of labor charges and the elimination of keypunching of this data, it was felt that any changes in the pattern of labor distribution statistics could be detected immediately and easily traced to the only new devices in use; namely, the data collection and communications equipment.

The system operated satisfactorily in the 36 Remote Input Station Configuration installed in March 1962. However, as additional units were added to the system, troubles began to occur. At the end of June 1962, the system had grown in size to 66 Remote Input Stations. As anticipated, equipment problems were being documented which had not been observed in either the laboratory or the prototype installations. Each equipment problem was identified and catalogued for study. Consequently, some 30 engineering changes were considered necessary. It was then mutually agreed between RCA and LMSC to suspend production use of the system until the changes could be installed and checked out. The required changes to the system were made during the month of July 1962. During this time Remote Input Stations already installed were modified and changes were fed into RCA's production line where additional input stations were being built. This period of time was also used to clean up procedures and evaluate employee training requirements. The engineering changes to equipment made by RCA were successfully accomplished and no major operation problems have been experienced since the initial changes were made in July 1962.

Much valuable operating experience was gained through the use of ADA's data collection network in the feeding of labor distribution data from the factory floor directly into paper tape recording units. Meanwhile, arrangements were being made to replace the central paper tape recording equipment with on-line central processing equipment (RCA 301 EDP systems) necessary to provide inquiry and reply capabilities never before possible between the employee in the factory and a modern digital computer.

The Computation Center's central processing equipment was successfully installed and has been in full-time service since November 1962. ADA's on-line central processing equipment consists of two RCA 301 EDP systems which are interconnected to provide mutual back-up support during periods when one machine is down for maintenance or required for program modification checkout runs. This two-computer arrangement enables the Computation Center to provide at least one computer to receive incoming messages around the clock, seven days a week, without interruptions to factory operations.

During normal operations each of the interconnected RCA 301 EDP systems is assigned separate functions to evenly distribute the incoming workload. Computer "A" receives each incoming message from the 206 Remote Input Stations and 25 Inquiry Stations, tags each message with the date and time to the nearest 100th of an hour, and stores a copy of the message on magnetic tape for future use as input to another RCA 301 EDP system not connected to the on-line system. In addition, Computer "A" passes all inquiries and status messages across an interconnecting cable to Computer "B" which is assigned the function of maintaining the master records on the RCA 363-5 Data Disc File. The Data Disc File provides storage space for 88 million characters of information. The data are stored on the flat surfaces of 24 magnetic discs, each one over a yard wide. These magnetic discs spin beneath read/write devices that can locate every fact and figure on the file as the discs rotate at the rate of 1,200 times per minute.

The on-line computer system is also connected, via telephone lines, to 32 remotely-located page printer stations. These stations can be individually selected to receive printed replies prepared from disc file information supplied under control of the "B" computer upon request of an authorized Inquiry Station. Four remotely located IBM 026 Card Punch machines have also been provided; each is fitted with adapters which enable the machine to receive replies to inquiries in punched card form. The card punch units are used in applications where it is desirable to receive information in punched card form for use by other machines, usually Remote Input Stations.

The data gathering and inquiry/reply functions performed by ADA are simple in concept. Listed in "cookbook" order, the functions are as follows:

(1) Master records are set up on the Data Disc File for each manufacturing shop order and vendor purchase order written by the company.

(2) Detail information about each order is recorded via Remote Input Stations as each job moves through the shops or shipments of purchased items are received from vendors.

(3) The information transmitted by the Remote Input Stations is recorded on magnetic tape to form a chronological journal of the company's basic business transactions related to manufacturing, procurement, and labor costs accumulation.

(4) Master records on the Data Disc File are constantly updated by incoming information to reflect pertinent details received and stored on the Journal tape.

(5) Inquiries submitted via Inquiry Stations are received and answered immediately, using current information taken from the Data Disc File records.

(6) Unusual conditions are detected and noted by the computer program. Reports are prepared for attention of responsible personnel.

(7) Master records are added to or deleted from the Data Disc File as new orders are opened or closed.

(8) Historical information is periodically read from records on the Data Disc File for use as input to various periodic accounting and status reports designed to show patterns in the company's use of its resources.

(9) Audit trails are maintained and prescribed accuracy checks are performed automatically to ensure compliance with standards established to maintain management confidence in the usefulness and value of all functions performed.

would like more details on these Audit Trails. With such we could bring Budget & Finance into the MIS

The functions performed by ADA's hardware system closely parallel the functions performed by the traditional bookkeeper, whose job has been taken over in recent times by an ever-increasing number of white collar workers. These workers must specialize in such tasks as Accounts Payable, Payroll, Timekeeping, Labor Audit, and Cost Accounting in order to keep pace with new reporting requirements. Of course, there are many more reports required to meet changing market conditions and to comply with new government regulations. Nevertheless, it is surprising to note that the nation's white collar work force, which replaced the bookkeeper, has more than doubled in the past twenty years and now, for the first time, outnumbers the production work force, whose numbers have actually diminished five percent in the same period.

amazing!

Perhaps even more significant is the fact that the white collar worker, with great assistance from modern digital computers, has not been able to provide management and supervisory personnel with timely information regarding the status of the company's in-process business transactions.

deliverable

In addition to the elimination of a sizeable amount of clerical work at LMSC, ADA provides management and supervision with instant information concerning many areas of company activities. ADA presently handles 30,000 incoming transactions per day reported by 5,000 individual employees throughout the company. The system also transmits over 2,000 replies to remote printers and card punch machines in response to inquiries received from the Inquiry Stations and simultaneously keeps track of the recorded movement of more than 10,000 shop orders per day.

This level of input/output activity between the factory and the Computation Center is maintained by a never-ending flow of orders from the Company's Procurement organization whose 150 buyers issue 2,500 purchase orders per week and the Manufacturing Orderwriting organization which issues 2,000 shop orders per week. Each order issued by these organizations must provide a specific item at a specified time and place required to meet company commitments. ADA keeps track of each of these orders, monitors schedule performance, and manages to handle the record-keeping details generated by the receipt of 1,000 vendor shipments a day and the manufacture and completion of parts and assemblies at the rate of 400 shop orders a day.

The use of ADA has not required any changes or restrictions to LMSC's basic manufacturing and procurement orderwriting procedures. Perhaps even more important is the fact that data-recording functions performed by the production workers have been simplified and new flexibility has been created to permit rapid response to any type of requirement to change factory operating methods, procedures, and equipment layouts. The ADA Remote Input Stations are simply moved to any location where they are needed to record useful information.

LMSC's Procurement organization has placed ADA remote equipment on the receiving docks to mechanize paper handling and reduce processing delays. Instead of adding a new accounting burden at the docks, the use of this equipment has actually increased LMSC's receiving capacity 35 percent and reduced clerical and expediting requirements by 25 percent. The backlog of delivered items waiting on the dock for preparation of paper work to authorize receipt and inspection operations have been virtually eliminated.

The use of ADA in the receiving area works like this:

for some stimulating thought think of film rather than "items" and apply this section to NPIC

(1) The incoming items are off-loaded from trucks and placed on a roller conveyor.

(2) Each package is opened and the packing slip is examined to obtain LMSC's purchase order number.

(3) The purchase order number is transmitted via an inquiry unit to the ADA center where information is available from the Data Disc File.

(4) The information on file is automatically sent to the receiving dock, via telephone line, to a printer which prepares a receiving memo document containing specifications for inspection, disposition of freight charges, and the destination stock room or other organization. A punched card, automatically prepared at the dock, includes the part number, receiving location, and date and serial sequence of the dock receipt. The punched card and receiving memo are placed with the shipment.

(5) The shipment is checked for conformance to requirements listed in the receiving memo. The punched card is placed in a Remote Input Station and the operator sets the unit's variable levers to report the type of transaction, the vendor's packing slip number, and the next destination for the shipment. Quantity adjustments required at this point are also reported via the Remote Input Station.

(6) The arrival of the shipment, as reported via the input station to the Computation Center, automatically causes a notice of arrival to be printed on a printer located in the buyer's area and notifies the expediter on another printer if the item is in short supply.

(7) If the receiving memo received from the Computation Center also lists a requirement for a technical inspection, the shipment, including the paperwork and punched card, is routed to the proper inspection line. The acceptance or rejection of the shipment and the quantity inspected are reported, using the punched card and the Remote Input Station's variable data levers.

(8) The punched card remains with the shipment for use in other Remote Input Station units to record the movement of the shipment from station to station until it is logged into Stores.

ADA's present day record-keeping job for Procurement ends at the Stores area. However, an application presently being developed for ADA will enable the system to

keep track of items as they move from Stores to various stations for use in the finished product. ADA will also keep a running record of every purchased item maintained in the company's stock rooms and initiate requests for new purchase orders when items fall below specified inventory levels. This application is planned for full-time operation before mid 1964.

As mentioned previously, ADA also does the job of shop order location and traffic control for more than 40,000 shop orders which are in the company's shops at any given time. The ADA system requires the order-writing organization to perform only one new function to permit ADA to take control of the shop order package and monitor its progress through the entire manufacturing process. The new function requires the keypunching of master cards which contain the schedule information, estimated labor hours, and work order information listed on the written order attached to the production job package. These master cards are accumulated and batch-fed into the ADA system. A master record is established on the 88-million-character Data Disc File for each new shop order. Once established on the Disc File, the master record on each active shop order is immediately accessible for automatic updating or for use in answering inquiries about the job's location and status in the shop.

One of the punched cards prepared by the orderwriting group is called the shop order control travel card. This card contains the shop order number, part number, and the scheduled manufacturing start and completion dates. The travel card is placed with the manufacturing job package and it remains with the package throughout the production process.

The shop order control travel card serves a variety of useful purposes in reporting the status of the shop order. Upon release of the job package to the first scheduled load center, the travel card is inserted in a Remote Input Station, along with a plastic token (which identifies the load center) and a message is sent to the Computation Center. The message reporting the location of the job package is immediately stored on the Journal Tape and the master record for that particular shop order is updated on the Data Disc File to show the new location.

When the supervisor assigns the shop order to a worker the travel card is used again; this time with employee's ID token in the Remote Input Station to initiate a labor charge against the shop order. This information is stored on the Journal Tape at the Computation Center for later use in calculating the elapsed employee time to be included in labor distribution reports. When the job is completed, or the worker's shift ends, the employee uses his token to clock off and end the labor charge. The worker's supervisor may use the same travel card and his own identification token to claim credit for completion of operation steps performed in his load center. When all operations in the particular load center have been completed the travel card is used to log the job to the next station. The travel card can also be used to report jobs that are being held for any reason and to report inspection results.

Since the master record maintained on the Data Disc File is updated immediately upon receipt of information from the shop, ADA is able to respond to inquiries from Inquiry Stations instantly with up-to-the minute information. This capability is frequently used to locate jobs in process to permit faster implementation of engineering changes. Under the old system, labor and materials were frequently wasted in the time interval between the development of an engineering change and the location of affected shop orders in process. The inquiry system is also used to locate job packages which need schedule changes in order to meet expedited manufacturing objectives.

Although ADA performs these tasks simultaneously for both the Manufacturing and Procurement organizations, the system still has considerable remaining capacity to service additional Remote Input Stations plus increased traffic from existing input stations. A recent traffic analysis shows the ADA can handle increased workloads during at least 80 percent of each workday.

In addition to its use in maintaining the open shop orders and purchase order records on the Data Disc File, the information collected by ADA and stored on the system's Journal Tape is fed into another RCA 301 computer at approximately 2-hour intervals. During this operation each transaction on the Journal Tape must pass close

scrutiny by the third RCA computer. The computer's program looks for such things as alphabetic characters where there should be none; improper field lengths; and other data errors which were passed "undetected" by the fast check given the data at the time of receipt. Each transaction which in any way looks suspicious to the computer is printed in a report which is immediately examined by operating personnel.

The timely availability of this information which always shows the ID number of the employee involved, transmitting station number, and the exact time of the transmission, makes is possible for the ADA auditor (formerly the labor auditor) to place a phone call to the shop to correct the cause of the trouble. Corrective action usually involves the replacement of damaged or incorrectly punched travel cards or worker retraining by the shop supervisor in the proper use of the Remote Input Station. In cases where frequent automatic repeat messages or minor machine malfunction is apparent from a particular station, an RCA service engineer is dispatched to inspect and repair the Remote Input Station involved. The timely detection and correction of errors has done much to eliminate the frequency of errors and to improve the usefulness of data reported from the factory floor, thereby reducing the number of "suspense" charges and "post closing adjustments" required to correct clerical errors.

At the end of each day's business the accumulated transactions, and on-the-spot adjustments made during the day, are sorted by type of transaction and subsequently fed into various other computer runs to produce status reports.

More than 30 computer applications have been developed or adapted to receive input directly from the reporting source via ADA equipment. Under the old system, information was usually handwritten on a variety of transmittal documents, held by the originating organization until a specified closing date, and then the documents were funneled through a control organization to a centralized card punch section where the handwritten information was converted to punched card form which could be read by data processing machines. Under this system, balancing operations were required prior to report-producing runs to ensure that the punched card data prepared by

the Keypunch unit balanced to control totals submitted by the control organization. Rarely did the cards and control totals agree on the first balancing attempt, thus adding more time to the process cycle. ADA now makes it possible to collect better information faster without the expensive delays inherent in the old system. This new ability now makes it practical to take a new look at old data processing applications to determine better ways to do business. In addition to the 30 conventional computer applications now receiving data input from ADA, a recent systems survey at LMSC revealed at least 40 additional applications which would benefit from ADA's existing capabilities. Many of these applications will be added to the existing data collection system in 1964.

PART NUMBER	SHOP ORDER NO.	SCHEDULE START	SCHEDULE COMP.	QTY.	STATION IN	STATION IN NAME	STATION TO	STATION TO NAME	HFC	T	MFG. DAY

Sample Inquiry response print outs

FORM LMSC 2428A — SHOP ORDER INQUIRY REPLY — LOCKHEED AIRCRAFT CORPORATION

PART NUMBER	SHOP ORDER NO.	SCHEDULE START	SCHEDULE COMP.	QTY.	STATION IN	STATION IN NAME	STATION TO	STATION TO NAME	HFC	T	MFG. DAY
1395694 004	91120F-[illegible]99173				13365-35		7275-35				1113>
1395694 004	040720-[illegible]123135				130044-53		3302-02				1110>
1395694 004	554875-[illegible]153173				13321-32		-				1113>
1395694 004	END 71625										>

the Keypunch unit balanced to control totals submitted by the control organization. Rarely did the cards and control totals agree on the first balancing attempt, thus adding more time to the process cycle. ADA now makes it possible to collect better information faster without the expensive delays inherent in the old system. This new ability now makes it practical to take a new look at old data processing applications to determine better ways to do business. In addition to the 30 conventional computer applications now receiving data input from ADA, a recent systems survey at LMSC revealed at least 40 additional applications which would benefit from ADA's existing capabilities. Many of these applications will be added to the existing data collecti- system in 1964.

PART NUMBER	SHOP ORDER NO.	SCHEDULE START	SCHEDULE COMP.	QTY.	STATION IN	STATION IN NAME	STATION TO	STA

FORM LMSC 2428A — SHOP ORDER INQUIRY REPLY — LOCKHEED AIRCRAFT CORPORATIO

PART NUMBER	SHOP ORDER NO.	SCHEDULE START	SCHEDULE COMP.	QTY.	STATION IN	STATION IN NAME	STATION TO	STATION TO NAME	HFC	T	MFG. DAY
1395694 004	55437E-33	15	173		13321-32		-				1113>
1395694 004	END 71618										>

system in 1964.

PART NUMBER	SHOP ORDER NO.	SCHEDULE START	SCHEDULE COMP.	QTY.	STATION IN	STATION IN NAME	STATION TO	STATION TO NAME	HFC	T	MFG. DAY

Sample

Inquiry response

print outs

FORM LMSC 2428A — SHOP ORDER INQUIRY REPLY — LOCKHEED AIRCRAFT CORPORATION

PART NUMBER	SHOP ORDER NO.	SCHEDULE START	SCHEDULE COMP.	QTY.	STATION IN	STATION IN NAME	STATION TO	STATION TO NAME	HFC	T	MFG. DAY
1395694 004	91120F-33199133				13365-35		7275-35				1113>
1395694 004	040720-33123135				130044-53		3302-02				1110>
1395694 004	554375-33153173				13321-32		-				1113>
1395694 004	END 71625										>

FORM LMSC 2428A — SHOP ORDER INQUIRY REPLY — LOCKHEED AIRCRAFT CORPORATION

Approved For Release 2008/06/13 : CIA-RDP73T00325R000100120004-6